WHAT IS CLAIMED IS:

1. An exposure method for projecting, through a projection optical system, a predetermined pattern formed on a mask onto an object to be exposed, said exposure method comprising the steps of:

calculating a Zernike sensitivity coefficient that represents sensitivity of a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial in plural point light sources that divide an effective light source area for illuminating the mask; and

determining an effective light source distribution based on intensity of each point light source and the Zernike sensitivity coefficient.

2. An exposure method according to claim 1, wherein said calculating step repeats for a combination of all the plural point light sources and the Zernike coefficient.

3. An exposure method according to claim 1, wherein said determining step determines the effective light source using a combination of the point light sources while changing intensity of the point light

sources and maintaining image quality of the predetermined pattern.

4. An exposure method according to claim 1, wherein the wave front aberration includes residual aberration in the projection optical system.

5. An exposure apparatus comprising:

a projection optical system for projecting a predetermined pattern formed on a mask onto an object to be exposed;

an illumination optical system for varying an effective light source distribution for illuminating the mask; and

a controller for controlling the effective light source shape based on a Zernike sensitivity coefficient that represents sensitivity of a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial.

6. A database suitable for an exposure method for projecting, through a projection optical system, a predetermined pattern formed on a mask onto an object to be exposed, said database indicating a Zernike sensitivity coefficient that represents sensitivity of

a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial.

7. A program that enables a computer to execute an exposure method for projecting, through a projection optical system, a predetermined pattern formed on a mask onto an object to be exposed,

wherein said exposure method includes the steps of:

calculating a Zernike sensitivity coefficient that represents sensitivity of a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial in plural point light sources that divide an effective light source area for illuminating the mask; and

determining an effective light source distribution based on intensity of each point light source and the Zernike sensitivity coefficient.

8. A device fabrication method comprising the step of:

exposing an object using an exposure apparatus; and

performing a predetermined process for the object exposed,

wherein an exposure apparatus includes:

a projection optical system for projecting a predetermined pattern formed on a mask onto an object to be exposed;

an illumination optical system for varying an effective light source distribution for illuminating the mask; and

a controller for controlling the effective light source shape based on a Zernike sensitivity coefficient that represents sensitivity of a change of image quality of the predetermined pattern to a change of a Zernike coefficient, when wave front aberration in the projection optical system is developed into a Zernike polynomial.